CLAIMS

What is claimed is:

1. A controller for use in controlling a plurality of devices within a process, the controller comprising:

a processor adapted to be programmed to execute one or more programming routines;

a memory coupled to the processor and adapted to store the one or more programming routines to be executed on the processor;

a plurality of field device input/output ports communicatively connected to the processor; and

a configuration communication port connected to the processor and to the memory;

wherein the controller can operate as a stand-alone controller or as one of a plurality of controllers within a distributed process control system.

2. The controller of claim 1, wherein the processor is a general purpose processor.

3. The controller of claim 1, further including a second communication port adapted to be intermittently connected to a user interface to enable the user interface to view information stored within the memory or the processor;

4. The controller of claim 3, wherein the second communication port is a MODBUS TCP communication port.

5. The controller of claim 4, further including a register map stored in the memory adapted to be accessed by the second communication port.

6. The controller of claim 3, wherein second communication port is a serial communication port.

7. The controller of claim 6, wherein the second communication port is an RS-485 communication port.

8. The controller of claim 3, further including a register map stored in the memory adapted to be accessed by the second communication port.

9. The controller of claim 3, wherein the second communication port is a MODBUS TCP communication port and further including a third communication port that is a serial communication port.

10. The controller of claim 1, wherein the memory includes a non-volatile portion adapted to store configuration information pertaining to the controller.

11. The controller of claim 10, wherein the non-volatile portion of the memory is adapted to store the one or more programming routines.

12. The controller of claim 1, further including the plurality of programming routines and wherein the plurality of programming routines are compatible with a distributed process control system programming paradigm.

13. The controller of claim 12, wherein the distributed process control system programming paradigm is compatible with the Fieldbus protocol.

14. The controller of claim 12, wherein the distributed process control system programming paradigm is an object oriented programming paradigm.

15. The controller of claim 1, wherein configuration communication port is adapted to be intermittently connected to a configuration device and wherein the processor is adapted to execute the one or more programming routines when the configuration communication port is not connected to the configuration device.

16. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes a fuzzy logic control routine.

17. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes a neural network control routine.

18. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes a model predictive control routine.

19. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes an adaptive tuning routine.

20. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes an optimization routine.

21. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes an alarming routine.

22. The controller of claim 1, further including the one or more programming routines and wherein the one or more programming routines includes a diagnostic routine.

23. The controller of claim 1, further including a wireless transmitter and receiver associated with at least one of the plurality of field device input/output ports.

24. The controller of claim 1, further including a ruggedized housing and wherein the processor and the memory are disposed within the ruggedized housing.

25. The controller of claim 24, wherein the ruggedized housing is sealed.

26. The controller of claim 24, wherein the ruggedized housing is adapted to provide a safe housing in an environmentally hazardous location.

27. The controller of claim 1, further including:

a second communication port adapted to be connected to another controller;

an input/output extension having;

a multiplexer;

a second plurality of field device input/output ports communicatively connected to the multiplexer; and

an extension communication port adapted to be intermittently connected to another controller; and

a communication link between the second communication port and the extension communication port.

28. A controller for use in controlling a plurality of devices within a process, the controller comprising:

a processor adapted to be programmed to execute one or more programming routines;

a memory coupled to the processor and adapted to store the one or more programming routines to be executed on the processor;

a configuration communication port connected to the processor and to the memory; and

a second communication port adapted to be intermittently connected to a user interface to enable the user interface to view information stored within the memory or the processor;

wherein the controller can operate as a stand-alone controller or as one of a plurality of controllers within a distributed process control system.

29. The controller of claim 28, further including a third communication port that is a serial communication port.

30. The controller of claim 29, wherein the second communication port is a MODBUS TCP communication port.

31. The controller of claim 29, further including a register map stored in the memory adapted to be accessed by the second communication port or by the third communication port.

32. The controller of claim 29, wherein the third communication port is an RS-485 communication port.

33. The controller of claim 28, wherein the memory includes a non-volatile portion adapted to store configuration information pertaining to the controller.

34. The controller of claim 28, further including the plurality of programming routines and wherein the plurality of programming routines are compatible with a distributed process control system programming paradigm.

35. The controller of claim 34, wherein the distributed process control system programming paradigm is an object oriented programming paradigm.

36. The controller of claim 28, wherein configuration communication port is adapted to be intermittently connected to a configuration device and wherein the processor is adapted to execute the one or more programming routines when the configuration communication port is not connected to the configuration device.

37. The controller of claim 28, further including a ruggedized housing and wherein the processor and the memory are disposed within the ruggedized housing.

38. The controller of claim 37, wherein the ruggedized housing is adapted to provide a safe housing in an environmentally hazardous location.

39. A controller for use in controlling a plurality of devices within a process, the controller comprising:

a processor adapted to be programmed to execute one or more programming routines;

a non-volatile memory coupled to the processor and adapted to store the one or more programming routines to be executed on the processor;

a plurality of field device input/output ports communicatively connected to the processor;

a configuration communication port connected to the processor and to the memory; and

a second communication port adapted to be intermittently connected to a user interface to enable the user interface to view information stored within the memory or the processor;

wherein the controller can operate as a stand-alone controller or as one of a plurality of controllers within a distributed process control system.

40. The controller of claim 39, further including a third communication port that is a serial communication port.

41. The controller of claim 40, wherein the second communication port is a MODBUS TCP communication port.

42. A method of configuring a distributed process control system having one or more controllers and one or more remote input/output devices, wherein each of the controllers has a field device input/output port associated therewith, the method comprising:

physically communicatively connecting one of the controllers within the distributed process control system;

physically communicatively connecting one of remote input/output devices within the process control system without physically connecting the one of the remote input/output devices directly to the field device input/output port of the one of the controllers; and

logically communicatively connecting the one of the remote input/output devices directly to the one of the controllers.

43. The method of configuring a distributed process control system of claim 42, wherein the step of logically communicatively connecting includes storing communication routines in each of the one of the controllers and the one of the remote input/output devices to communicate directly with one another.

44. The method of configuring a distributed process control system of claim 42, wherein the step of physically communicatively connecting the one of the controllers includes the step of physically communicatively connecting the one of the controllers to a bus and physically communicatively connecting a second one of the controllers to the bus and wherein the step of physically communicatively connecting the one of the remote input/output devices includes the step of physically communicatively connecting the one of the remote input/output devices to the bus.

45. The method of configuring a distributed process control system of claim 42, further including displaying the one of the remote input/output devices as logically connected to the one of the controllers within a configuration hierarchy display.

46. The method of configuring a distributed process control system of claim 42. further including the step of physically connecting a local input/output device directly to the field device input/output port of the one of the controllers.

47. The method of configuring a distributed process control system of claim 42, wherein the step of logically communicatively connecting includes the step of logically communicatively connecting an individual port of the one of the remote input/output devices to the one of the controllers.

48. The method of configuring a distributed process control system of claim 47, further including the step of logically communicatively connecting a second individual port of the one of the remote input/output devices to a second one of the controllers.